

8. Heterosis of egg weight and egg production

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Heterosis is the phenomenon that performance in hybrid organisms is superior to the average performance of their parents. Utilization of heterosis in commercial breeding schemes relies on identifying the best crossbred from extensive cross-examination. Our objective was to quantify egg weight and egg production in reciprocal crosses of two extreme chicken lines. In this study, 4 different groups were created. 1) 30 Beijing-You (Y) roosters were mated with 150 Y hens to generate YY offspring, 2) same roosters were mated with 150 White Leghorn (W) hens to generate YW offspring, 3) 30 W roosters were mated with 150 W hens to generate WW offspring and 4) same roosters were mated with 150 Y hens to generate WY offspring. Egg weight at first egg and every four week from 28wk to 68wk, age at first egg and egg number until 43wk were measured, and heterosis was estimated. The mean and standard deviation of egg weight increased with aging. The standard deviation for age at first egg varies considerably within cross lines, being lower for YW than for WY. And for egg number until 43wk, standard deviation were similar for cross lines. Estimated heritabilities for egg weight between 28wk to 68wk were high (0.56-0.85), with the highest value at 48wk. Genetic correlations between egg weight at different ages were high (0.64-1.00), especially for the neighbouring time points. Age at first egg was positively related with egg number until 43wk. Both these egg production traits showed moderate heritability. Both YW and WY showed significant and favourable heterosis (1.07%-6.65%) for egg weight throughout the laying period. The heterosis for egg weight increased during the laying period, and was higher for YW than for WY. Age at first egg and egg number until 43wk showed favourable heterosis, and the heterosis for egg number was higher for WY than for YW. Favourable and high heterosis was observed for egg weight and egg production traits in a cross between Beijing-You and White Leghorn. Moreover, for egg weight, it tended to be higher if Beijing-You was the sire line and White Leghorn was the dam line which was in contrast to egg production traits.